

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| His | Cys | Ser | Trp | Val | Ser | Glu | Lys | Glu | Tyr | Ser | Glu | Ala | Ala | Asn | Ile | 145 | 150 | 155 | 160 |
| His | Pro | Arg | Leu | Arg | Thr | Arg | Leu | Asn | Asn | Phe | Arg | Arg | Gln | Lys | Glu | 165 | 170 | 175 |     |
| Ala | Met | Lys | Ile | Glu | Ala | Glu | Arg | Ser | Gly | Glu | Asp | Ile | Val | Ala | Ile | 180 | 185 | 190 |     |
| Arg | Pro | Glu | Trp | Thr | Thr | Val | Asp | Arg | Ile | Leu | Ala | Ser | Arg | Lys | Asn | 195 | 200 | 205 |     |
| Leu | Val | Gly | Asp | Arg | Glu | Tyr | Tyr | Val | Lys | Trp | Asn | Glu | Leu | Thr | Tyr | 210 | 215 | 220 |     |
| Glu | Glu | Cys | Thr | Trp | Glu | Asn | Glu | Ser | Asp | Ile | Thr | Val | Phe | Gln | Pro | 225 | 230 | 235 | 240 |
| Glu | Ile | Glu | Arg | Phe | Asn | Glu | Ile | Gln | Phe | Arg | Arg | Lys | Lys | Ser | Gly | 245 | 250 | 255 |     |
| Asp | Lys | Gly | Lys | Ala | Thr | Arg | Glu | Pro | Arg | Gln | Phe | Lys | Glu | Ser | Pro | 260 | 265 | 270 |     |
| Thr | Phe | Leu | Ser | Gly | Gly | Thr | Leu | His | Pro | Tyr | Gln | Leu | Glu | Gly | Leu | 275 | 280 | 285 |     |
| Asn | Phe | Leu | Arg | Tyr | Ser | Trp | Phe | His | Asn | Lys | Arg | Val | Ile | Leu | Gly | 290 | 295 | 300 |     |
| Asp | Glu | Met | Gly | Leu | Gly | Lys | Thr | Ile | Gln | Ser | Ile | Ala | Phe | Leu | Ala | 305 | 310 | 315 | 320 |
| Ser | Leu | Phe | Glu | Asp | Lys | Phe | Gly | Pro | His | Leu | Val | Val | Ala | Pro | Leu | 325 | 330 | 335 |     |
| Ser | Thr | Leu | Arg | Asn | Trp | Glu | Arg | Glu | Phe | Ala | Thr | Trp | Ala | Pro | Gln | 340 | 345 | 350 |     |
| Met | Asn | Val | Val | Met | Tyr | Phe | Gly | Ala | Ala | Ala | Ser | Arg | Asp | Ile | Ile | 355 | 360 | 365 |     |
| Arg | Lys | Tyr | Glu | Phe | Tyr | Tyr | Pro | Lys | Glu | Lys | Leu | Lys | Lys | Leu | Lys | 370 | 375 | 380 |     |
| Lys | Lys | Lys | Ser | Ser | Pro | Ser | Asn | Glu | Asp | Lys | Lys | Gln | Ser | Arg | Ile | 385 | 390 | 395 | 400 |
| Arg | Phe | Asp | Val | Leu | Thr | Ser | Tyr | Glu | Met | Ile | Asn | Met | Asp | Ser |     | 405 | 410 | 415 |     |
| Ser | Ile | Leu | Lys | Asn | Ile | Glu | Trp | Glu | Cys | Leu | Val | Val | Asp | Glu | Gly | 420 | 425 | 430 |     |
| His | Arg | Leu | Lys | Asn | Lys | Asp | Ser | Lys | Leu | Phe | Gly | Gln | Leu | Lys | Asp | 435 | 440 | 445 |     |
| Tyr | Asn | Thr | Lys | His | Arg | Val | Leu | Leu | Thr | Gly | Thr | Pro | Val | Gln | Asn | 450 | 455 | 460 |     |
| Asn | Leu | Asp | Glu | Leu | Phe | Met | Leu | Met | His | Phe | Leu | Glu | Gly | Glu | Ser | 465 | 470 | 475 | 480 |
| Phe | Gly | Ser | Ile | Thr | Asp | Leu | Gln | Glu | Glu | Phe | Lys | Asp | Ile | Asn | Gln | 485 | 490 | 495 |     |
| Asp | Lys | Gln | Ile | Glu | Lys | Leu | His | Gly | Met | Leu | Lys | Pro | His | Leu | Leu | 500 | 505 | 510 |     |
| Arg | Arg | Phe | Lys | Lys | Asp | Val | Met | Lys | Glu | Leu | Pro | Pro | Lys | Lys | Glu | 515 | 520 | 525 |     |
| Leu | Ile | Leu | Arg | Val | Glu | Leu | Thr | Arg | Lys | Gln | Lys | Glu | Tyr | Tyr | Lys | 530 | 535 | 540 |     |
| Ala | Ile | Leu | Thr | Lys | Asn | Tyr | Glu | Val | Leu | Ala | Arg | Arg | Asn | Gly | Gly | 545 | 550 | 555 | 560 |
| His | Thr | Ser | Leu | Ile | Asn | Val | Val | Met | Glu | Leu | Arg | Lys | Leu | Cys | Cys | 565 | 570 | 575 |     |
| His | Gly | Phe | Met | Ile | Asp | Glu | Pro | Asp | Leu | Glu | Pro | Ala | Asn | Pro | Glu | 580 | 585 | 590 |     |

|      |      |     |     |     |      |      |      |     |     |      |      |      |     |     |      |  |  |
|------|------|-----|-----|-----|------|------|------|-----|-----|------|------|------|-----|-----|------|--|--|
| Glu  | Gly  | Leu | Arg | Arg | Leu  | Leu  | Asp  | Ser | Ser | Gly  | Lys  | Met  | Gln | Leu | Leu  |  |  |
|      |      | 595 |     |     |      |      | 600  |     |     |      |      | 605  |     |     |      |  |  |
| Asp  | Lys  | Met | Met | Val | Lys  | Leu  | Lys  | Glu | Gln | Gly  | His  | Arg  | Val | Leu | Ile  |  |  |
|      | 610  |     |     |     |      | 615  |      |     |     |      | 620  |      |     |     |      |  |  |
| Tyr  | Ser  | Gln | Phe | Gln | His  | Met  | Leu  | Asp | Leu | Leu  | Glu  | Asp  | Tyr | Leu | Ser  |  |  |
| 625  |      |     |     |     | 630  |      |      |     |     | 635  |      |      |     |     | 640  |  |  |
| Tyr  | Arg  | Lys | Trp | Thr | Tyr  | Glu  | Arg  | Ile | Asp | Gly  | Lys  | Ile  | Ser | Gly | Ala  |  |  |
|      |      |     |     | 645 |      |      |      |     | 650 |      |      |      |     | 655 |      |  |  |
| Asp  | Arg  | Gln | Ile | Arg | Ile  | Asp  | Arg  | Phe | Asn | Ala  | Lys  | Asn  | Ser | Thr | Arg  |  |  |
|      |      |     | 660 |     |      |      |      | 665 |     |      |      |      | 670 |     |      |  |  |
| Phe  | Cys  | Phe | Leu | Leu | Ser  | Thr  | Arg  | Ala | Gly | Gly  | Leu  | Gly  | Ile | Asn | Leu  |  |  |
|      |      | 675 |     |     |      |      | 680  |     |     |      |      | 685  |     |     |      |  |  |
| Ala  | Thr  | Ala | Asp | Thr | Val  | Ile  | Ile  | Tyr | Asp | Ser  | Asp  | Trp  | Asn | Pro | His  |  |  |
|      | 690  |     |     |     |      | 695  |      |     |     |      | 700  |      |     |     |      |  |  |
| Ala  | Asp  | Leu | Gln | Ala | Met  | Ala  | Arg  | Ala | His | Arg  | Leu  | Gly  | Gln | Thr | Ser  |  |  |
| 705  |      |     |     |     | 710  |      |      |     |     | 715  |      |      |     |     | 720  |  |  |
| Lys  | Val  | Met | Ile | Tyr | Arg  | Leu  | Val  | Ser | Arg | Gly  | Thr  | Ile  | Glu | Glu | Arg  |  |  |
|      |      |     |     | 725 |      |      |      |     | 730 |      |      |      |     | 735 |      |  |  |
| Met  | Met  | Gln | Leu | Thr | Lys  | Lys  | Lys  | Ile | Leu | Leu  | Glu  | His  | Leu | Val | Val  |  |  |
|      |      |     | 740 |     |      |      |      | 745 |     |      |      |      | 750 |     |      |  |  |
| Gly  | Arg  | Leu | Thr | Lys | Ala  | Asn  | Asn  | Val | Asn | Gln  | Glu  | Glu  | Leu | Asp | Asp  |  |  |
|      |      | 755 |     |     |      |      | 760  |     |     |      |      | 765  |     |     |      |  |  |
| Ile  | Ile  | Arg | Tyr | Gly | Ser  | Lys  | Glu  | Leu | Phe | Glu  | Asp  | Glu  | Asn | Asp | Glu  |  |  |
|      | 770  |     |     |     |      | 775  |      |     |     |      | 780  |      |     |     |      |  |  |
| Ser  | Arg  | Gln | Ile | His | Tyr  | Asp  | Glu  | Ala | Ala | Ile  | Glu  | Arg  | Leu | Leu | Asp  |  |  |
| 785  |      |     |     |     | 790  |      |      |     |     | 795  |      |      |     |     | 800  |  |  |
| Arg  | Asp  | Gln | Val | Asp | Gly  | Asp  | Glu  | Ser | Val | Glu  | Asp  | Glu  | Glu | Glu | Asp  |  |  |
|      |      |     |     | 805 |      |      |      |     | 810 |      |      |      |     | 815 |      |  |  |
| Gly  | Phe  | Leu | Lys | Gly | Phe  | Lys  | Val  | Ala | Asn | Phe  | Glu  | Tyr  | Ile | Asp | Glu  |  |  |
|      |      |     | 820 |     |      |      |      | 825 |     |      |      |      | 830 |     |      |  |  |
| Ala  | Lys  | Ala | Gln | Ala | Glu  | Lys  | Glu  | Glu | Ala | Arg  | Arg  | Lys  | Ala | Ala | Ala  |  |  |
|      |      | 835 |     |     |      |      | 840  |     |     |      |      | 845  |     |     |      |  |  |
| Glu  | Ala  | Glu | Asn | Ser | Glu  | Arg  | Asn  | Tyr | Trp | Asp  | Glu  | Leu  | Leu | Lys | Asp  |  |  |
|      | 850  |     |     |     |      | 855  |      |     |     |      | 860  |      |     |     |      |  |  |
| Arg  | Tyr  | Asp | Val | Gln | Lys  | Val  | Glu  | Glu | His | Thr  | Ala  | Met  | Gly | Lys | Gly  |  |  |
| 865  |      |     |     |     | 870  |      |      |     |     | 875  |      |      |     |     | 880  |  |  |
| Lys  | Arg  | Ser | Arg | Lys | Gln  | Met  | Ala  | Ala | Ala | Asp  | Glu  | Asp  | Asp | Ile | His  |  |  |
|      |      |     |     | 885 |      |      |      |     | 890 |      |      |      |     | 895 |      |  |  |
| Asp  | Leu  | Ser | Ser | Glu | Asp  | Glu  | Asp  | Tyr | Ser | Leu  | Glu  | Asp  | Asp | Ile | Ser  |  |  |
|      |      |     | 900 |     |      |      |      | 905 |     |      |      |      | 910 |     |      |  |  |
| Asp  | Asn  | Asp | Thr | Ser | Leu  | Gln  | Gly  | Asn | Ile | Ser  | Gly  | Lys  | Arg | Gly | Gln  |  |  |
|      |      | 915 |     |     |      |      | 920  |     |     |      |      | 925  |     |     |      |  |  |
| Tyr  | Ser  | Lys | Arg | Lys | Ser  | Arg  | Asn  | Val | Asp | Ser  | Ile  | Pro  | Leu | Met | Glu  |  |  |
|      | 930  |     |     |     |      | 935  |      |     |     |      | 940  |      |     |     |      |  |  |
| Gly  | Glu  | Gly | Arg | Thr | Leu  | Arg  | Val  | Leu | Gly | Phe  | Asn  | His  | Ala | Gln | Arg  |  |  |
| 945  |      |     |     |     | 950  |      |      |     |     | 955  |      |      |     |     | 960  |  |  |
| Ala  | Met  | Phe | Leu | Gln | Thr  | Leu  | Asn  | Arg | Phe | Gly  | Phe  | Gln  | Asn | Tyr | Asp  |  |  |
|      |      |     |     | 965 |      |      |      |     | 970 |      |      |      |     | 975 |      |  |  |
| Trp  | Lys  | Glu | Tyr | Leu | Pro  | Arg  | Leu  | Lys | Gly | Lys  | Ser  | Val  | Glu | Glu | Ile  |  |  |
|      |      |     | 980 |     |      |      |      | 985 |     |      |      |      | 990 |     |      |  |  |
| Gln  | Arg  | Tyr | Ala | Glu | Leu  | Val  | Met  | Ala | His | Leu  | Val  | Glu  | Glu | Ile | Asn  |  |  |
|      |      | 995 |     |     |      |      | 1000 |     |     |      |      | 1005 |     |     |      |  |  |
| Asp  | Ser  | Asp | Tyr | Phe | Ser  | Asp  | Gly  | Val | Pro | Lys  | Glu  | Met  | Met | Arg | Val  |  |  |
|      | 1010 |     |     |     |      | 1015 |      |     |     |      | 1020 |      |     |     |      |  |  |
| Asp  | Asp  | Val | Leu | Val | Arg  | Ile  | Ala  | Asn | Ile | Ser  | Leu  | Ile  | Glu | Glu | Lys  |  |  |
| 1025 |      |     |     |     | 1030 |      |      |     |     | 1035 |      |      |     |     | 1040 |  |  |

|      |      |      |      |      |      |      |      |      |      |      |      |      |     |      |      |  |  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|------|------|--|--|
| Met  | Ala  | Ala  | Thr  | Gly  | Pro  | Gly  | Lys  | Ile  | Thr  | Asn  | Ile  | Phe  | Pro | Asn  | Tyr  |  |  |
|      |      |      |      | 1045 |      |      |      |      |      | 1050 |      |      |     |      | 1055 |  |  |
| Leu  | Leu  | Tyr  | Glu  | Phe  | Gln  | Gly  | Leu  | Ser  | Gly  | Gly  | Arg  | Ile  | Trp | Lys  | Ala  |  |  |
|      |      |      | 1060 |      |      |      |      |      | 1065 |      |      |      |     | 1070 |      |  |  |
| Glu  | His  | Asp  | Leu  | Leu  | Leu  | Leu  | Arg  | Gly  | Ile  | Leu  | Lys  | His  | Gly | Tyr  | Ala  |  |  |
|      |      | 1075 |      |      |      |      | 1080 |      |      |      |      | 1085 |     |      |      |  |  |
| Arg  | Trp  | Gln  | Tyr  | Ile  | Ser  | Asp  | Asp  | Arg  | Glu  | Asn  | Gly  | Leu  | Phe | Glu  | Ala  |  |  |
|      | 1090 |      |      |      |      | 1095 |      |      |      |      | 1100 |      |     |      |      |  |  |
| Ala  | Arg  | Arg  | Glu  | Leu  | His  | Leu  | Pro  | Ser  | Val  | Asn  | Glu  | Ile  | Ile | Gly  | Ala  |  |  |
| 1105 |      |      |      |      | 1110 |      |      |      |      | 1115 |      |      |     |      | 1120 |  |  |
| Gln  | Leu  | Asn  | Glu  | Ala  | Asn  | Gly  | Asn  | Leu  | Glu  | Gly  | Ala  | Gln  | Glu | Gly  | Gln  |  |  |
|      |      |      | 1125 |      |      |      |      |      | 1130 |      |      |      |     | 1135 |      |  |  |
| Ala  | Asn  | Thr  | Thr  | Ser  | Met  | Ser  | His  | Tyr  | Lys  | Glu  | Ile  | Gln  | Arg | Lys  | Ile  |  |  |
|      |      | 1140 |      |      |      |      |      | 1145 |      |      |      | 1150 |     |      |      |  |  |
| Val  | Glu  | Phe  | Leu  | Arg  | Lys  | Arg  | Tyr  | His  | Leu  | Met  | Glu  | Arg  | Ala | Leu  | Asn  |  |  |
|      | 1155 |      |      |      |      |      | 1160 |      |      |      |      | 1165 |     |      |      |  |  |
| Leu  | Glu  | Tyr  | Ala  | Val  | Ile  | Lys  | Lys  | Lys  | Ile  | Pro  | Val  | Pro  | Asp | Asp  | Ile  |  |  |
|      | 1170 |      |      |      |      | 1175 |      |      |      |      |      | 1180 |     |      |      |  |  |
| Thr  | Glu  | Gln  | Gly  | Val  | Pro  | Ala  | Gly  | His  | Ala  | Pro  | Leu  | Ile  | Pro | Asp  | Ile  |  |  |
| 1185 |      |      |      |      | 1190 |      |      |      |      | 1195 |      |      |     |      | 1200 |  |  |
| Ser  | Glu  | Leu  | Leu  | Arg  | Glu  | Leu  | Pro  | Asn  | Leu  | Glu  | Pro  | Ile  | Ser | Thr  | Asn  |  |  |
|      |      |      | 1205 |      |      |      |      |      | 1210 |      |      |      |     | 1215 |      |  |  |
| Glu  | Leu  | Ile  | Ser  | Glu  | Gly  | Thr  | Ala  | Gly  | Gln  | Leu  | Gln  | Val  | Pro | His  | Leu  |  |  |
|      |      | 1220 |      |      |      |      |      | 1225 |      |      |      | 1230 |     |      |      |  |  |
| Tyr  | Asn  | Lys  | Met  | Cys  | Gly  | Val  | Leu  | Glu  | Glu  | Ser  | Gly  | Ala  | Tyr | Ala  | Leu  |  |  |
|      | 1235 |      |      |      |      |      | 1240 |      |      |      |      | 1245 |     |      |      |  |  |
| Ser  | Ser  | Phe  | Phe  | Gly  | Asp  | Lys  | Ser  | Ala  | Ser  | Ser  | Thr  | Leu  | Ala | Asn  | Ser  |  |  |
|      | 1250 |      |      |      | 1255 |      |      |      |      |      | 1260 |      |     |      |      |  |  |
| Leu  | Arg  | Gln  | Phe  | Glu  | Thr  | Val  | Cys  | Glu  | Asn  | Val  | Val  | Glu  | Ala | Leu  | Arg  |  |  |
| 1265 |      |      |      |      | 1270 |      |      |      |      | 1275 |      |      |     | 1280 |      |  |  |
| Pro  | His  | Gln  | Asn  | Gly  | Thr  | Ala  | Ser  | Ala  | Ile  | Lys  | Glu  | Glu  | Leu | Val  | Asp  |  |  |
|      |      | 1285 |      |      |      |      |      |      | 1290 |      |      |      |     | 1295 |      |  |  |
| Ala  | Ala  | Thr  | Lys  | Ala  | Ala  | Ala  | Ala  | Ala  | Ala  | Pro  | Gln  | Gln  | Asp | Ser  | Gly  |  |  |
|      |      | 1300 |      |      |      |      |      |      | 1305 |      |      |      |     | 1310 |      |  |  |
| His  | Asp  | Ala  | Pro  | His  | Gly  | Gln  | Ser  | Ser  | Thr  | Ala  | Lys  | Ala  | Asp | Met  | Glu  |  |  |
|      | 1315 |      |      |      |      |      | 1320 |      |      |      |      | 1325 |     |      |      |  |  |
| Ile  | Asp  | Gly  | Phe  | Val  | Gly  | Ser  | Arg  | Val  | Ala  | Arg  | Lys  | Gly  | Ile | Pro  | Ser  |  |  |
|      | 1330 |      |      |      |      | 1335 |      |      |      |      | 1340 |      |     |      |      |  |  |
| Asn  | His  | Tyr  | Val  | Tyr  | Cys  | Gly  | Gln  | Asn  | Val  | Arg  | Tyr  | Ile  | Leu |      |      |  |  |
| 1345 |      |      |      |      | 1350 |      |      |      |      | 1355 |      |      |     |      |      |  |  |